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Learning from Sustained Success: How Community-Driven Initiatives to Improve Urban Sanitation Can Meet the Challenges

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Summary. — Past research by one of the authors of this paper has identified four key institutional challenges that community-driven initiatives to improve sanitation in deprived urban settlements face: the collective action challenge of improving community sanitation; the coproduction challenge of working with formal service providers to dispose of the sanitary waste safely; the affordability challenge of reconciling the affordable with what is acceptable to both users and local authorities; and the tenure challenge of preventing housing insecurity from undermining residents' willingness to commit to sanitary improvement.

In this article we examine how two well-documented, relatively successful and longstanding initiatives, the Orangi Pilot Project and an Alliance of Indian partners, met these challenges. They were met through social innovation, but also through the choice and development of sanitation technologies (simplified sewers for OPP and community toilet blocks for the Indian Alliance) that provided traction for the social innovations. We also explore more recent efforts by civil society partnerships in four African cities, demonstrating some of the difficulties they have faced in trying to overcome these challenges. No equivalent models have emerged, though there has been considerable progress against particular challenges in particular places.

These findings confirm the importance of the challenges, and indicate that these are not just challenges for social organization, but also for technology design and choice. For example, the problem with household pit latrines is not that they cannot physically be improved to sufficiently, but that they are not well-suited to the social, economic and political challenges of sanitary improvement at scale. The findings also indicate that a low economic status and a tendency to treat sanitation as a private good not suitable for public support also makes the sanitation challenges difficult to overcome.

Key words — sanitation, coproduction, community organization

1. INTRODUCTION

Recent research by McGranahan (2015) describes four institutional challenges to low-cost sanitation: a collective action challenge, a coproduction challenge, an affordability challenge, and a housing tenure challenge. These challenges are held to make it difficult for the conventional institutions of the "modern" economy—private property and markets on the one hand, and the state and bureaucratic processes on the other—to provide sufficient low-cost sanitation. McGranahan argues that these challenges help to explain why sanitation often lags behind many other services and commodities. This paper explores this proposition through analyzing how two community-driven efforts have managed to achieve considerable success and sustainability by addressing these challenges. Drawing on a recent action-research project it also explores the difficulties other community-driven efforts have faced in their attempts to improve sanitation provision through addressing these challenges. Based on this research, we argue that while the challenges are fundamentally institutional in nature, overcoming the challenges depends not just on social and institutional innovation, but also finding or developing technologies that match the institutional challenges as they are manifested locally.

(a) *Simplified summaries of four institutional challenges commonly facing sanitation-deprived urban communities*

This short summary of the challenges is based on McGranahan (2015), which also situates these challenges within the relevant literature.

(i) *The local collective action challenge*

A person's sanitation problems depend in large part on the sanitation facilities and behaviors of others, and if everyone behaves in narrowly self-interested ways, sanitation will be far worse that what would emerge from efficient and effective cooperation or collective action. Suppose you live in a settlement where there is open defecation, where latrines flood onto the pathways in the rainy season or contaminate local wells, and where people do not wash their hand after defecating. If you act alone it makes little difference to the sanitation problems you face. If those exposed to local sanitation deficiencies act collectively, rather than pursuing individual self-interest independently, all can benefit. But orchestrating this is a challenge. Markets will not supply adequate sanitation, and this is often taken as evidence of the need for state regulation or provision (to avoid what was described in Winters, Karim, & Martawardaya, 2014, as a "tragedy of the commons"). More local collective action can also make a difference, and is especially important where state-based solutions are not available

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or are too expensive. As Ostrom (2000) describes in her pioneering work on collective action and the emergence of social norms, the challenge of collective action can take many forms, and even for sanitation it varies with the technology as well as the social, economic, and political context.

(ii) *The coproduction challenge*

The coproduction challenge is especially evident with low-cost on-site sanitation. The state (or a utility) and the residents (or their organizations) need to collaborate in producing better sanitation, partly because neither can do it alone and partly because collaboration enhances mutual accountability. By coproduction we mean "a process through which inputs from individuals who are not 'in' the same organization are transformed into goods and services" (Ostrom quoted in McGranahan, 2015, p. 245). In this paper the specific focus is on collaboration between the residents of informal settlements and public agencies. Local residents cannot be expected to take responsibility for the ultimate treatment of the fecal sludge, and even if working collectively they have little incentive to do so beyond the borders of their neighborhood. In effect, even if neighborhoods address their own collective action problem, in the absence of onsite recycling the temptation will be to dump or drain the waste out of the neighborhood creating a second order collective action problem. A more centralized public organization is critical for managing the ultimate disposal or recycling of the waste. But such an organization cannot be expected to manage individual latrines, and experience suggests they cannot manage toilet blocks or other low-cost facilities at a reasonable cost. The use of regulations to enforce improvements in low-income settlements is also problematic (as described under affordability below). This leaves coproduction as the obvious, but by no means easy, option.

(iii) *The affordability challenge*

There is a simple economic affordability challenge: for those with unacceptably low incomes, acceptable sanitation is unaffordable. But this applies to almost all commodities, and this paper is concerned with how the affordability of sanitation becomes a social and institutional challenge (for an insightful review of the difficulties even with estimating the value of sanitation improvements see Whittington, Jeuland, Barker, & Yuen, 2012). In low-income settings is that neither the state nor the market is in a good position to decide what is affordable to whom, and even community organizations have difficulty eliciting this. The state is almost inevitably involved in setting standards for sanitation (whether these are followed or not), and often partially subsidizes some forms of sanitation. Unfortunately, where poverty is pervasive, efforts to enforce standards of sanitation that everyone can agree are acceptable can lead to the authorized sanitation options being unaffordable to many, even with any subsidies made available. Low-income households can face disheartening difficulties if their efforts at improved sanitation are penalized because they contravene standards. The challenge is to negotiate costs down without sacrificing unnecessarily on quality, in a context where the collective action and coproduction challenges combine with the house tenure challenge to complicate such negotiation.

(iv) *The house tenure challenge*

House tenure relates to a complex set of challenges whose resolution lies beyond the normal responsibilities of the water and sanitation sector, but which can undermine efforts to improve sanitation. Many low-income urban dwellers live in settlements where land ownership, or at least the way it is being used, is disputed. Fear of being displaced is a disincentive to investing in things like sanitation facilities that will have to be left behind. Utilities, whether privately or publically run, often avoid significant investments such as sewage networks in settlements with insecure tenure; hence the costs of household solutions may rise. Moreover, tenants have little reason to invest in sanitation facilities, and sanitation can easily become a matter of dispute between owners and tenants. Residents may have an incentive to invest if this will enable the settlement to be regularized, but taking advantage of such opportunities is complicated...

(b) *Overview of the main body of this article*

Through the lenses of the four institutional challenges, the main body of this article examines three community-led efforts to improve sanitation. The first, misleadingly named the Orangi Pilot Project (OPP), started out in the 1980s as an exploratory engagement with the residents of one of the world's biggest informal settlements, and has since transformed the sanitation situation in Karachi, and still operates today. The second is the work of the Indian Alliance that brought together the Indian National Slum Dwellers' Federation (NSDF), a women's network initiated by pavement dwellers (Mahila Milan) and an NGO called the Society for the Promotion of Resource Centres (SPARC). Their sanitation work began in Mumbai in the late 1980s, and also persists to this day, having spread to other cities and become closely integrated with large-scale government programs.

The third example is more recent and involves the work of Alliances of Federations of the Urban Poor and their support NGOs in the urban centers of Blantyre (Malawi), Chinhoyi (Zimbabwe), Dar es Salaam (Tanzania) and Kitwe (Zambia). These Alliances, all of which are affiliates of Shack/Slum Dweller International (SDI), have been involved in a three-year program of action-research supported by the SHARE consortium (http://www.shareresearch.org/), referred to here as the Four Cities Sanitation Project (FCSP). All had previously been involved in efforts to improve sanitation in informal settlements, but the action-research gave them the opportunities to think and act on sanitation more strategically and at the city-scale. These Alliances have learned from the work of both the OPP and the Indian Alliance, which was itself a founding member of SDI (described in more detail below). The action-research project has used the four challenges as a learning framework to advance improved access to sanitation.

For OPP and the Indian Alliance, we show how their success in addressing the four challenges helped them to sustain the work over a long period and assist more than 100,000 households to secure sanitation improvements, and to achieve an influence at the city and national levels. Both efforts involved concerted attempts to organize community members so that their common demands could be articulated and acted on collectively. Both eventually managed to secure political and practical support from local authorities, leading to the effective coproduction of sanitary improvement. Both adopted technologies that not only matched their approaches to collective action and coproduction, but were more affordable, if officially less acceptable, than conventional sanitation technologies. And both used sanitation to achieve greater legitimacy and tenure security for the residents. Their successes were not complete and this article is not meant to be an evaluation of institutional performance generally, but an attempt to demonstrate that their ability to meet these challenges helps to explain the success in the field of sanitation. Through this analysis we demonstrate the value of the framework presented in McGranahan (2015).

For the SDI affiliates we show that headway has been made against all of the challenges, but much still remains to be achieved. For example, SDI mobilization and organization has helped in motivating people to improve their sanitation. Documentation on the sanitation problems and engagement with local authorities have opened up possibilities for collaboration (and potentially coproduction). Innovative loans, success in getting some authorities to accept unconventional technologies, and redesigning technologies to bring costs down have eased the affordability challenge. And negotiations with landlords have helped to overcome the housing tenure challenge. However, simple pit latrines are still the most prevalent low-cost solution, but are poorly suited to community action or coproduction with local authorities or utilities. Despite the variety of technological and institutional options, there are no obvious models of success that can clearly be reproduced at scale without a level of subsidy authorities cannot or at least have not provided.

In summary, we argue that the challenges presented in the earlier framework can indeed be central to securing low-cost sanitation, and that the framework is of value in understanding success. But we show that simply understanding the framework is not sufficient to secure sanitation. These are complex challenges that depend on the institutional approaches, the sanitation technologies, and how they operate together. In both Pakistan and India, each of the challenges has been overcome through multiple and varied efforts, and in both cases the technologies suited the forms of local collective action and coproduction that they developed, despite their low cost. In the case of the FCSP, the challenges are still daunting, and the more affordable and locally adapted technologies are not generally conducive to overcoming the collective action, coproduction, and tenure challenges. Moreover, with little scope for subsidies, the possibilities for matching technological and social innovation is limited. Progress has been made, and hopeful precedents have been set, but without technological or political transformation it remains difficult to see the basis for extending basic sanitation to everyone in these cities by 2030, the target year in the current draft of the Sustainable Development Goals (United Nations, 2015).

(c) *Methodology*

This paper draws on diverse methodologies. The analysis of OPP and Indian Alliance case studies draws on earlier research projects that both authors have been involved in and a more longstanding exposure to and engagement with the work of these agencies that is, in methodological terms, close to political ethnography (Auyero, 2006). SDI is a transnational network of national federations of savings groups located primarily in urban informal settlements in the Global South (see Section 4 below). Both authors have previously collaborated with SDI and are familiar with the approaches. SDI agreed to participate in the SHARE research consortium to gain structured knowledge on how the deficit in urban sanitation in sub-Saharan Africa could be addressed. For SHARE and the authors, the benefit of collaboration lay in drawing on the knowledge and perspectives of organizations of the urban poor. SHARE focus countries included Malawi and Tanzania and it was agreed that Zambia and Zimbabwe affiliates would be invited to participate to broaden the research base. Cities were selected by affiliates in consultation with the SHARE research team and SDI staff. The action component within the project included community mapping of sanitation needs, sanitation precedents and relation-building activities between organized residents and relevant authorities. Data were collected by SDI affiliates based on research frameworks that were collaboratively designed. Additional data were secured directly by the authors and other researchers through regular meetings, in-depth interviews and participant observation.

2. THE ORANGI PILOT PROJECT AND ITS SIMPLIFIED SEWERS

The Orangi Pilot Project (OPP) was started in 1980 by Dr. Akhtar Hameed Kahn, a well-known Pakistani practitioner and thinker, whose austere ways of living and working still imbue the organization (for summaries of the development of the project see: Hasan, 2010; Pervaiz, Rahman, & Hasan, 2008; Satterthwaite & Mitlin, 2014). It began as an action research and extension project in Orangi, which was then Karachi's largest *katchi abadi* or informal settlement. In the course of an extended dialog with residents and others, sanitation emerged as a key issue. The low-cost sanitation program that was developed provided technical and organizational support for residents to build a sanitary latrine in each house, an underground sewer in each lane, and a collector sewer in each neighborhood, this last feeding into a trunk sewer provided by the state. This final stage was only reached some years after the start of the program.

By August 2012, the OPP's approach to sanitation had been adopted by over 90% of Orangi's informal housing, or about 107,000 households (Satterthwaite & Mitlin, 2014). Moreover, the approach spread to most other informal settlements in Karachi, and to many other cities in Pakistan and beyond.

There is considerable overlap between the four challenges discussed in this paper and the four barriers preventing improvements by communities identified by the OPP in the early 1980s (Pervaiz *et al*., 2008, p. 58):

1. The *social* barrier of lacking the community organization to engage in collective action.
2. The *psychological* barrier of thinking that improved sanitary facilities should and will be given to them by the government.
3. The *economic* barrier of not being able to afford to cover the costs of conventional sanitation facilities.
4. The *technical* barrier of not having access to the technical support needed to develop affordable sanitation systems of reasonable quality.

The *social* barrier is related to the collective action challenge, the *psychological* barrier is at least tangentially related to the coproduction challenge, and the *economic* barrier is related to the affordability challenge (we have defined the affordability challenge in less narrowly economic terms, but it should be noted that the OPP barrier is not that they are unable to afford adequate or improved sanitation but that they are not able to afford conventional sanitation).

(a) *OPP and the collective action challenge*

The lane, with its 20–40 households, its lane managers, and its sewer, has been the critical unit of local collective action achieved through OPP (Hasan, 2008, 2010; Pervaiz *et al*., 2008). The organized lane and its sewer represent the coming together of neighboring households to take control of the problems in their street, moving out of the private sphere into the public. Lane organizations enabled people to shift from individual to collective decision-making, and tap their full demand for improved sanitation, hidden when people were

making their sanitation decisions independently and in their own narrow self-interest.

The OPP model eventually developed around a nested set of collective action levels, each with associated technologies: the household and its toilet, the lane and its lane sewer, the neighborhood and its collector sewer, and the public at large and its state-provided trunk sewer. Each level organized differently, and the environmental health externalities are only avoided if each level plays its part. If the state did not provide the trunk sewer, the collector sewer would pollute the city, if the neighborhood did not provide the collector sewer the lane sewer would pollute the neighborhood, and if the lane did not provide their sewer the household's sewage would pollute the lane. There were still incentives to free-ride, and for example for individual lane residents to avoid contributing to the construction and maintenance of the lane sewers, but everyone was under pressure to agree to contribute to the construction, and once the drains were in place the basis for monitoring and enforcing cooperation was organizationally relatively straightforward.

OPP attempted to initiate collective action by holding public meetings in the lanes, discussing sanitation conditions in detail, and indicating that if a lane organization was formed and appointed lane managers, then OPP staff would provide technical support. The technical support included surveying the lane, mapping and costing the work, demarcating the position of the drain, providing tools, and overseeing the entire execution—but not handling the finance, which was done by a lane manager and lane committees. The lanes OPP first engaged with were those near natural drainage channels to which sewage could be diverted. As the process spread, OPP identified the need for collector drains. When the local government refused to fund these, confederations of lanes were formed to finance and build them. In some cases, waste descended into other neighborhoods until the government took action. Many lanes also organized themselves spontaneously, having seen others succeed.

OPP's support for community organization changed over time. OPP did not intervene directly in the lane organization or related disputes. Also, while the organization of the lanes was critical, and played an analogous role to triggering within Community Led Total Sanitation (Kar, 2008), higher levels of collective action were encouraged. Not only were the confederations of lanes formed to deal with neighborhood-wide coordination and negotiation, but when city-wide issues arose there was collective action at this level too. Thus, in resisting a large loan-financed sewerage project proposed for Korangi (another area of Karachi), with US$70 million from the Asian Development Bank, over 20 public fora were organized, with large numbers actors involved (Pervaiz *et al*., 2008, p. 33). OPP staff supported an Urban Resource Centre to strengthen the organizations of informal settlement residents across the city, and enhance their ability to engage successfully with both government and the broader constituency of professionals working in Karachi (Anwar, 2011; Urban Resource Centre, 1994). This can be viewed as involving a loose form of collective action, but has also contributed to co-production.

(b) *OPP and the coproduction challenge*

Relations between OPP and the government changed over the years and with it the forms of coproduction. Coproduction is implicit in OPP's guiding principle of "component sharing", which is how OPP describe their system whereby local residents are responsible for the internal development up to the trunk sewer that is the responsibility of the state. The extent to which the OPP approach has melded with the practices of public providers in Karachi has been exceptional. OPP fostered a system in which local residents became willing to take on responsibilities officially borne by the public providers, but also more effective in getting these public providers to deliver on their remaining responsibilities. OPP made public agencies aware of the informal sanitation systems of the residents, helping to map them in detail, eventually for all of Karachi. This information had not been collected by government institutions because they had presumed the informal systems did not matter, and that there was no scope for coproduction.

In Ostrom's seminal article introducing the concept of coproduction to development studies (Ostrom, 1996), one of her leading examples was of condominial sewers in Brazil, with many similarities to the simplified sewers used by OPP. In both cases local residents had to cooperate, act collectively, and coproduce their sanitary improvements, eventually with the public providers as partners. In Orangi, however, the local government contributions came relatively late in the process, and changes within the community were the driving force.

By organizing to work collectively in the lanes, the residents both encroached on public space and engaged with the public sector. It was this engagement that eventually made the public providers more accountable to the low-income residents. However, the physical properties of sanitary burdens helped ensure the public sector coproduced improvements, once local residents were getting their waste out of the neighborhoods. The state could ignore insanitary public spaces so long as these were confined to low-income settlements. Once sewage was flowing into adjoining parts of the city it was indisputably a state responsibility. The state could persist in blaming OPP and residents, but it eventually addressed the challenge in a constructive manner, probably because the costs of inaction rose while the costs of coproduction fell. These same characteristics made sanitation an appropriate area of work for an organization like OPP. With technical support, local collective action could yield large and visible benefits, and OPP could contribute while strengthening rather than replacing local organization. Simultaneously, coproduction provided a route to scaling up the community engagement to city-wide and eventually national interventions.

(c) *OPP and the affordability challenge*

One of the core principles of OPP's sanitation work has been to help people achieve the sanitation that they can afford—which is not necessarily the sanitation they want or deserve. Prior to OPP's sanitation work, there was the perception in Orangi, apparently encouraged by "land grabbers" and agents who had developed the settlement, that more affluent areas received sanitation services for free. Local officials responded that the affluent paid for their sanitation through their high development charges, which Orangi residents could not afford.

One of the first tasks OPP faced was to develop a significant improvement in local sanitary conditions, while keeping costs down. They worked backward, starting with what people could afford, and modifying engineering standards to reduce costs to this level. It worked, if not in a first iteration, then in a second or third. OPP drew the lesson that local authority engineering standards may be friendly to contractors, but not to low-income communities.

To keep costs low, the underground sewer system was designed to take advantage of, rather than replace, the natural channels. Whenever possible drainage work already in place was also incorporated. OPP's own overheads were kept low:

its salary structure was kept in line with local rates, and volunteerism and self-help principles were applied. The materials and construction costs for the lane and collector sewers were not subsidized, but training and trunk sewers were provided free, creating the basis for coproduction. The cost per household for the sewer in the lane, the house connection and the sanitary latrine pan worked out at between US$ 15–50 in recent decades. For the collector sewer, cost varies considerably depending on the length of the sewer but is generally less than $5 for each household (Hasan, 2008; Satterthwaite & Mitlin, 2014).

OPP has agitated against large-scale and costly sewerage projects when the public sector has been planning them. Thus, OPP has tried to address the affordability project within the design and operations of the low-cost sanitation system, within their own operations, and even with the operations of the public provider. Their diagnosis is that the failure to pursue affordability undermines sustainability and scalability.

(d) *OPP and the house tenure challenge*

Within OPP, sanitation was conceived of as part of the residents' broader shelter and settlement-related problems. The goal of gaining secure tenure cut across all of OPP's activities. This has been viewed as more than just secure ownership of land, and to include recognition for the settlements and their informal components.

Tenure security in the *katchi abadi* of Karachi has depended on the scope for regularizing the settlement. This is influenced by adherence to planning regulations. Bad sanitation tends to make for bad politics, and also for regulatory problems. Working together outside the home to address the settlement's collective sanitation problems, and extending this to coproduction with local authorities, was an important means of improving the formal acceptance of people's private homes.

The OPP approach to sanitation is probably best known internationally for its mapping and component sharing. By making the informal sanitation system more visible and, once the local authorities were using the maps themselves, more accepted by the authorities, the simplified sewer system also improved the residents' house security (Hasan, 2009).

3. THE INDIAN ALLIANCE AND ITS COMMUNITY TOILET BLOCKS

The Indian Alliance partnered a predominantly male national organization of slum dwellers (NSDF), a female collective built around savings groups (Mahila Milan), and a professional but unconventional NGO (the Society for the Promotion of Area Resource Centres—SPARC). This Alliance brought together NSDF's political savvy, SPARC's professional knowledge, and Mahila Milan's community organization—initially in Mumbai. It has been presented by academics in such diverse guises as a radical new approach to deepening democracy (Appadurai, 2001) and a manifestation of edgy urban entrepreneurialism in the slums (McFarlane, 2012). It has also been critiqued for being too close to government (Roy, 2009; Zérah, 2009) and we return to this in the section on coproduction.

Sanitation was a concern of these organizations before they partnered. NSDF had been involved in demanding more and better-maintained latrines from politicians and public agencies. SPARC staff had been engaged with women's community organizations around sanitation-related issues like worms in children. The early pavement dwellers of Mahila Milan had particularly serious sanitation problems. In early discussions of the Alliance, securing permanent housing was the overarching concern for the women pavement dwellers, but the need for sanitation emerged as an immediate priority, and became central to their organizing strategy (Burra, Patel, & Kerr, 2003; Patel *et al*., 2015 draft; Patel & The SPARC Team, 2015).

From the Alliance's first community toilet block, built on P D'Mello Road in Mumbai, the Alliance's approach broke with the municipality's approach to toilet blocks. For the first time the municipality commissioned a collective of low-income residents to build a municipal toilet not for the public in general but for a specific pavement community. Local residents contributed to the design, working with professionals identified by SPARC. Mahila Milan women and other community members contributed unskilled labor. When completed, the Alliance deliberately sought media attention with a "toilet celebration".

Following P D'Mello toilet's success, the Alliance worked to convince local authorities to provide official sanction for community toilets, remove regulatory barriers, and to help find land to build on and finance for construction. Many early community toilets in other parts of Mumbai were financed with development assistance (Patel *et al*., 2015 draft), and government funding did not flow for some years. One of the earliest government responses was in Pune in 1998, where a commissioner developed a sanitation program with the municipality covering capital costs, land, water and electricity, and the Alliance (or other NGOs and communities) designing, constructing, and maintaining the toilets (Burra, 2005). Since, there have been many more opportunities in these and other cities, though not always as collaborative as in Pune.

In Mumbai, government funding is now available and the Alliance has been building community capacities to take advantage of these resources for community toilet blocks. Scale has been achieved: there have been approximately 1,000 toilet blocks built by the Alliance, with almost 20,000 seats, and getting on for a million users—roughly half in the Mumbai Metropolitan Region. The Indian Alliance helped to shape as well as contributing to the Mumbai Sewerage Disposal Project and the Mumbai Metropolitan Region Abhiyan universal sanitation programs. Staff have joined the task force that crafted India's national sanitation policy, announced by the Government of India in 2008 and the director has been a member of the National Advisory Group on Sanitation.

The Indian Alliance's approach to sanitary improvement worked implicitly to address the four challenges. They put the community residents and local organization at the center of the initiative (addressing the collective action challenge), secured contributions from the government (developing a coproductive relationship), innovated with communal block latrines (prioritizing affordability) and used toilet construction alongside other development efforts to change the negative imagery toward informal settlements and their residents (intended to improve housing security).

(a) *The Indian Alliance and the collective action challenge*

For the Indian Alliance, working with community toilet blocks was initially as much about increasing collective capacities within the communities as improving sanitary conditions. In words of the SPARC team:

> These toilets provided an important practical focus for the federating principles of the Alliance. A community toilet-building program gives a big push to communities to undertake projects. It creates the space for experimentation and allows for mistakes to be made and learning to happen. When poor communities in Mumbai and other cities around India

> undertook the process of designing, building, and managing their own toilets, it was a change in roles. They were no longer supplicants, begging the city for services. They were able to invite city officials to come and inspect what they had done. They owned the process, and they were the ones telling the city how they would like it to move.
>
> [Patel & The SPARC Team, 2015]

The choice of "communal" toilet blocks matches the collective nature of the problem with a collective response. Ideally, community-based organizations become the local agents of change, helping in the design, choosing the location, and setting the membership fee. SPARC provides technical and legal support, but on the ground it is networks of Mahila Milan and NSDF that deliver. The focus has been on inner-city settlements where individual dwellings are not large enough for toilets, but the community scale helps the residents combine their individual demands for sanitation improvements (which, being for a public good, are largely ineffectual on the market) into a collective demand for a cleaner and healthier and safer neighborhood.

In terms of their implications for collective solidarity, pride and action, the Indian Alliance contrast public and community toilets. Public toilets are built for anyone and owned by no-one. A community toilet is held in common by a well-defined group of people. A high-quality community toilet reflects a high-quality community. "Within the murky politics of land and tenure in Indian cities, the construction of a community toilet can be a powerful manoeuvre, *especially if it is built by the community itself*" (Burra *et al*., 2003).

Successful toilets provide evidence to other communities that local collective action can make a difference. Mahila Milan and NSDF support the sharing lessons among different neighborhoods and cities, and for engaging in higher level collective action. Within the community, the toilets are matched with other activities and structures that bring groups together, such as savings groups, which can in turn help run the toilet.

The community action associated with the toilets is sometimes made visible by placing a community meeting room on top or adjoining the toilet. This provides both a community venue and an incentive for ensuring the toilets are kept clean. This incentive is amplified when the toilets are managed by a caretaker who also lives in the immediate vicinity, and the toilets are located in central and visible locations, rather than being tucked away out of sight. Even adopting these strategies, achieving effective collective action has proved to be difficult, but sufficiently successful for the Alliance to persist.

(b) *The Indian Alliance and the coproduction challenge*

The Indian Alliance's work on community sanitation was a radical departure from the conventional government approach to sanitary provision and involved coproduction from the start. One of the major problems the Indian Alliance had identified in dialog with communities and government officials was that existing programs did not match what under-serviced communities wanted or needed (Patel *et al*., 2015 draft). Government funding was insufficient for sewered toilets except to a small minority, and alternatives such as public toilet blocks were inappropriately located, poorly designed and badly managed. The more technical side of the Alliance's push for coproduction has been expressed in terms of a simple metaphor of big pipes and little pipes:

> ``Only the city can handle these *big pipe* items, which involve politics and big budgets. Toilets and drainage lines, on the other hand, are genuine *little pipe* items and don't really require the city at all. They can be planned, installed and maintained locally, by communities. The federations propose a sort of deal to cities: stop wasting money and effort on the *little pipe* items that slum communities *can* handle themselves, and concentrate on the big-pipe items like expanding the sewerage and water-supply grids, that they *can't*."
>
> [Patel *et al*., 2015 draft]

The Indian Alliance claims that the unserved local residents need to be at the very center of local sanitary improvement, and drive the process, planning, managing, and constructing toilets. The local state is needed to provide linking infrastructure, legal permissions, and capital funds to enable the scaling up of local initiatives. This model under-pins the Alliance's approach. With support from the Indian Alliance, communities assess sanitary conditions, and use surveys and meetings to elicit and measure the collective demand for toilets. They locate sites where toilets can be constructed, and form local committees to oversee design, planning, construction, and ultimately the maintenance of the toilet. They approach the relevant authorities for permissions and negotiate arrangements under which municipalities pay for capital costs. Community involvement helps ensure that provisioning matches community needs, that there is transparency and accountability in the funding, and that the facilities and services are maintained. The government finances capital costs, provides extra-settlement disposal infrastructure and services, and ensures that the improvements can be accepted by officialdom.

The Indian Alliance's strategic engagement fits at least roughly with Albrecht's presentation of coproduction as a challenge to traditional planning, that "provides an interaction between the delivery of public goods (plans, policies, projects) and building strong, resilient, mutually supportive communities" (Albrechts, 2013). The "deep democracy" (Appadurai, 2001) may be weakened in some cases by co-option (Roy, 2009), but the experiences discussed here demonstrate the potential of sanitation for radically transforming relations between the state and its more deprived urban citizens.

Coproduction in the provision of basic services necessarily involves civil society engagement with the state in a range of negotiations, and the risk that co-option will occur has to be taken seriously (in part because it can be difficult to distinguish co-optation from non-co-optive coproduction). The benefits for democracy of civil society embeddedness are such that coproduction continues to be seen as relevant to democracy and development despite these risks (Evans, 2013), but that does not mean that benefits should be assumed. In the case of the Indian Alliance and sanitation, we are confident that there have been changes in the state's position on toilet subsidies resulting in substantive financial redistribution and the reform of procedures in response to community designs and explicit preferences. Moreover, SPARC has taken a public position of opposition to government plans for the redevelopment of Dharavi (Weinstein, 2014) showing that, at least for this agency in their work in Mumbai, collaboration can take place alongside a more confrontational position.

(c) *The Indian Alliance and the affordability challenge*

If a toilet is shared by two or more households it cannot be considered "improved", according to the definition used by the WHO/UNICEF Joint Monitoring Program on Water and Sanitation (WHO & UNICEF, 2014a). There has been a proposal to change this criterion so that it will only exclude toilets shared by more than five families (WHO & UNICEF, 2014b), but this would still exclude the community toilet blocks the Alliance has pioneered. This exclusion may be a warranted as a crude rule of thumb: the majority of toilet blocks are poorly managed. However, community toilet

blocks can be well managed, and these can be far superior to poorly managed latrines shared by a few households (see Mara, 2016, who develops the case for such systems, drawing on the experience of the Indian Alliance).

The Indian Alliance holds that toilet blocks are often the best option in conditions of extreme poverty in high-density settlements, provided they are restricted to the community living close-by, who is willing to maintain them well and share the costs fairly. For a house that is less than 250 ft^2 without running water, drainage or sewerage, there are hygienic, practical, and often cultural reasons for not having a low-cost toilet in the house. Furthermore, by taking on community toilets, the Alliance found that sanitation access could reach the bottom 30%, who could not afford individual toilets. In short, in this context, community toilets can be an important step forward, though they may still reflect unacceptable poverty.

The toilets built with support from the Alliance cost roughly US$600 per seat, or US$12 per person assuming 50 people per toilet. Wherever possible the capital costs have been covered by government. The membership charges of about US$1 per month per family for unlimited use are considerably less than families would have to pay for the prevailing pay-per-use toilets.

The Indian Alliance toilets are designed to be affordable, but include key features prioritized by users. Some of the popular innovations include separate doors and queues for men and women, children's toilets, easily accessible toilets for those with special needs, two-way swing doors to improve personal safety, a bathing place and a room for the caretaker. The meeting room can be rented out for additional income and improved affordability. In practice there is considerable variation in the quality of the toilets, risks of violence against women can be particularly difficult to address, and all other things equal private solutions would be preferred—but it is hard to see how this can be achieved in the face of the existing affordability constraints.

(d) *The Indian Alliance and the house tenure challenge*

The community sanitation efforts of the Indian Alliance emerged in discussions with women pavement dwellers in Mumbai "exploring the larger challenge of secure permanent housing" (Patel *et al.*, 2015 draft). The Alliance saw sanitary improvement as a stepping stone toward comprehensive upgrading of settlements and recognition of their residents, collectively as well as individually. When a community achieves better sanitation it can, in the right circumstances, use this to gain legitimacy, improve tenure security, and build the sort of social capital that drives more improvements. The Alliance uses communal toilet blocks to challenge anti-poor attitudes through celebrating their opening at toilet festivals (or sandas mela) (Appadurai, 2001).

Managed well, the community toilet blocks avoid some of the perverse outcomes that can result when the state subsidizes private toilets built by landlords, and the institutional disincentives that tenants face investing in sanitary improvements. Such actions will often be accompanied by rent hikes, which can force out existing tenants. Low-cost community facilities can also lead to higher rental values, but the effect is less, and there is more scope for addressing intra-community differences in ability to pay.

Even with government-led attempts to secure land for the latrines, tenure problems sometimes arose. Indeed, a number of the community toilets that the Alliance was commissioned to supply by municipalities were canceled due to tenure issues: "Land ownership in most of the slums was unclear in city records. When the work orders were given, many private landowners, or even public landowners, challenged the right of the municipality to proceed, and many cases went to court" (Patel *et al.*, 2015 draft). As this example indicates, the tenure situation is far more complicated than a simple case of informal settlements whose structure owners do not own the land.

4. LEARNING TO OVERCOME THE SANITATION CHALLENGES IN THE INFORMAL SETTLEMENTS OF BLANTYRE, CHINHOYI, DAR ES SALAAM AND KITWE

This sub-section focuses on how Shack/Slum Dwellers International (SDI) affiliates in aforementioned cities have responded, explicitly or implicitly, to the challenges of collective action, coproduction, affordability and tenure (for background see Banana *et al.*, 2015). This section examines attempts by groups with a more limited experience in sanitation, seeking out new solutions in diverse locations under a single project. The project had three phases each lasting about a year. The first included a situational assessment involving community-led sanitation profiling and enumerations (surveys). The second phase included sanitation precedents designed to demonstrate sanitation solutions offering the potential for scaling up. The third phase, concluding in September 2015, sought to strengthen city federations' work with the local authorities and move toward city-wide sanitation strategies.

SDI is a well-documented (Satterthwaite & Mitlin, 2014, pp. 159–172) international network that grew out of experiences of the Alliance in Mumbai, and learned from the Orangi Pilot Project. Community exchanges spread the Indian Alliance's organizing methods and strategies to South Africa in the early 1990s. Subsequently this process linked with other existing initiatives, catalyzing new federations of shelter-poor urban dwellers and their support NGOs, which formed their own Alliances. The formal network was launched in 1996, and has grown from the six founding members (South Africa, India, Namibia, Cambodia, Nepal, and Thailand) to over 30 affiliates.

The core form of organization within the slum/shack/homeless people's federations that constitute SDI is the savings scheme: local groups that draw together residents (mainly women) in low-income neighborhoods to save, share their resources and jointly address their collective needs. These local groups and the larger federations to which they belong engage in many community-driven initiatives to collect data, link to other grassroots groups and social movements, build relations with local authorities, upgrade informal and squatter settlements, improve tenure security and offer residents new development opportunities. Table 1 summarizes the level and duration of federation activity in the four cities involved in the FCSP.

SDI Alliances would seem to be well placed to address the sanitation challenges that are the subject of this article. Community organization and solidarity are central to the SDI approach, which should provide a strong basis for collective action. The Alliances work to develop collaborative relationships with local authorities, and to avoid relations of dependence, making coproduction a natural approach. Affordability has not only been a major concern in relation to the struggle for better housing, but being organized around savings groups SDI federations are in a good position to address the challenges of negotiating affordability. Finally, with the struggle for land and housing also central to their mission, they are well versed in tenure-related challenges.

Unfortunately, in most of urban Africa, low-cost sanitary facilities are still dominated by pit latrines that are treated as

Table 1. *Federation activity in Blantyre, Chinhoyi, Dar es Salaam and Kitwe*

	Blantyre	Chinhoyi	Dar	Kitwe
Date federation began organizing in the city	2004	2003	2004–05	2008
Settlements in which the federation is active	42	5	62	38
Number of savers (early 2015)	600	2300	4300	1200
Proportion of savers as proportion of informal settlement population	0.5%	32.7%	0.7%	3.6%

Source: Project documents.

private goods that, if they are officially allowed at all, residents should build and manage without government subsidies. Private latrines can have public benefits, and from an economic perspective are not strictly private goods. But local authorities are reluctant to devote public resources to providing private latrines in informal settlements. This reluctance is amplified when the authorities are concerned that excessive rural–urban migration into informal settlements is part of the problem, and do not want to subsidize such settlement. High levels of rental accommodation are also commonplace, complicating residents' ability to secure sanitation improvements.

Even before the FCSP, the SDI Alliances in each of the four cities were working on sanitation, and had identified a range of technological and institutional options suitable to different urban densities, groundwater levels and soil types, tenure types, and regulatory frameworks. What the project provided was the chance to develop a more systematic approach to sanitation upgrading, to work toward city-wide sanitation strategies that could be supported by local governments, and to learn from these efforts.

As the following sub-sections illustrate, considerable progress was made over the project's three years. Nevertheless, the numbers reached only range between 200 and 2,500 households across the four cities. The challenges remain daunting, and the period of experimentation and learning by doing is by no means over.

(a) *SDI Alliances in the four cities and the collective action challenge*

Independent of the collective action challenge of sanitation, the collective organization in communities is nurtured by SDI. Affiliates recognize that collective action for sanitation can improve local well-being and provide an organizing base for the urban poor, ensuring ongoing collective practice and supporting the capability of the movement for autonomous action. Such practical social organizing is believed to prevent the weakening of collective identity, which is a risk when movements advance their common goals and interests primarily through lobbying politicians. From this perspective, SDI's broader strategy for community-driven urban upgrading suits the collective action challenge sanitation poses.

A first step in the FCSP was collecting data about sanitation conditions in selected informal settlements, mapping out the houses and documenting their sanitary facilities. Within SDI's organizing methodologies, enumeration and mapping are seen as essential for agreeing settlement-wide priorities, instigating savings practices and strengthening positive relations with local authorities. Collecting the information on sanitation from every household provided the opportunity to mobilize households not already part of the savings groups. There was no explicit attempt to use the mapping exercise to trigger collective action to improve sanitation, as there is with CLTS mapping (Kar, 2008). However, enumeration exercises did help to build a collective intention to address sanitation problems, and the data collection was used to mobilize residents.

Prior to FCSP, most Alliance efforts had focused on household latrines provided within private plots (often for the landowner and tenants). Unfortunately, there is less scope for facilitating local collective action with private pit latrines than with the simplified sewers of the Orangi Pilot Project or the community block latrines of the Indian Alliance. Private pit latrines may have collective consequences, but do not lend themselves to community construction and maintenance. Moreover, private latrines allow facilities to be built to suit each household's budget, which keeps costs affordable, but can undermine the creation of social norms and standards, and in effect undermine collective action.

In all of the cities, the opportunities for collective responses were explored. Over the course of the FCSP, federation members and NGO staff shared experiences of community blocks developed elsewhere including those by the Indian Alliance, the Uganda Alliance (in Jinja and Kampala) and the Zimbabwe Alliance (in Harare). Precedents in both Chinhoyi and Blantyre included community toilet blocks, with several in Blantyre also serving markets. Simplified sewers were extended in Dar es Salaam with links to government collection ponds. In Blantyre, a sanitation project undertaken by the Alliance on a greenfield site provided an example of simplified waste water treatment technology. Community leaders were keen to build on this experience. However, difficulties finding the land to fit such systems into Blantyre's informal settlements made their replication difficult.

In Dar es Salaam where pit latrines are particularly common, one of the precedents chosen by the Alliance involved latrine emptying. While latrine emptying does not usually involve collective action, federation women were trained in using a "gulper" to empty the latrines and assisted in financing the purchase of a motorized tricycle and trailer to carry the sludge away (for a review of pit emptying technologies including the gulper see Still & Foxon, 2012). The intention has been to embed these emptying operations within local community organizations, helping to turn the toilet-emptying into a community-led operation.

(b) *SDI Alliances in the four cities and the coproduction challenge*

Like the Indian Alliance described above, SDI Alliances in the four cities are committed to coproduction, and collaborating with local authorities. However, unlike in India, none of the four Alliances are working with governments willing to fund the construction of on-site sanitation facilities or commit to the regular removal of fecal sludge from the settlements. Also unlike India, there were no budgets in place that the Alliances could draw on as precedents emerged. Part of this reluctance to finance sanitation probably lies in the lower national incomes and the low shares of this income going to government, though other contextual differences matter.

What makes coproduction particularly important is that while the communities are often best placed to develop and manage low-cost facilities in their settlements, they are not

well-placed to get the sewage or sludge out of the settlement and process it safely, or to pay for private services. Ecological sanitation is an exception, in that the fecal sludge is treated on site. This may explain why ecological sanitation has been attractive to the Alliances, and why several have gone out of their way to get local authorities to remove regulations prohibiting ecological sanitation. A further motivation is the frequency with which water supplies are interrupted and the need for alternatives to water-borne sanitation. As described under the affordability challenge, however, ecological sanitation is costly, and when applied to communal toilet blocks the behavioral changes required to make the technology effective have been demanding, limiting its applicability.

In Kitwe, the local Alliance tried to develop a coproduction relationship with the local utility, which had a donor project under the National Urban Water and Sanitation Program. The total project budget of $63 million had less than 10% for "Sanitation and Hygiene Promotion and Education", which included a component for about 1,000 latrines in Kitwe. Each latrine was to cost about US$ 1,000 and was to be provided to recipient households for free. The local Alliance pointed out that that the true costs were unaffordable to the estimated 33,000 households without adequate sanitation, and that providing this small share of households with free toilets would make it more difficult to provide affordable toilets at scale, using loans and realistic levels of government support. The engaged staff at the utility agreed that lower cost alternatives needed to be developed, but explained that the terms of the grant could not be changed. Delays persisted indefinitely in the face of the need to redesign the project. The ultimate effect was to undermine both local collective action and coproduction.

Local authorities have engaged with the activities in the four cities, but in an ad-hoc fashion. In Blantyre the local authority provided land for neighborhood toilet blocks, allowing the income to be retained by the neighborhood. In Chinhoyi, reconstruction of an existing council toilet block and the transfer of management to local residents who are council tenants has been permitted and the income is being used to capitalize a revolving fund. In Dar, the authorities allowed the contents of the simplified sewer to drain into the wastewater treatment for a charge, and have offered to co-fund extensions to this network.

While this support is significant to the Alliances, it cannot easily be scaled to provide city-wide sanitation coverage across most informal settlements. In Chinhoyi and part of Dar es Salaam there is acknowledgment of co-dependency in the development of sanitation solutions. In the former it is being catalyzed by the crisis in local government financing in Zimbabwe, and in the latter by increasing attention to urban water and sanitation in national policy discussions. What is lacking is either support for models where local authorities take responsibility for components of the sanitation (such as the removal and treatment of the sludge away from the settlement) or models that combine private and public resources effectively enough to achieve scale.

(c) *SDI Alliances in the four cities and the affordability challenge*

The affordability challenge in many low-income African cities is acute, and has two faces. First, it is rarely possible to find sanitation solutions that are at once acceptable and affordable: acceptable to either the users or their governments, and affordable given the combined resources users and their governments feel they are able to devote to improving sanitation. This reflects technical difficulties, a lack of investment in developing low-cost technologies, and the low priority individual users and their governments give to sanitation. But it also reflects the unacceptable poverty many people live in. It is unreasonable to expect those living on unacceptably low incomes to afford acceptable sanitation. This relates to the second face of the affordability challenge: when low-income residents do agree on an affordable sanitation improvement, they risk the double indignity of agreeing to devote their scarce resources to improved facilities that they cannot really afford, only to have authorities tell them these facilities are not up to standard.

Reflections from Zambia, Zimbabwe, Malawi, and Uganda suggested that if SDI affiliates wish to reach significant numbers of lower income families they have to bring the monthly household costs of sanitation down to USD 3–4 (Banana *et al.*, 2015). SDI Alliances have three main strategies to reduce the cost of sanitation. The first is the use of savings and loan funds to spread the cost of capital investments. Households are typically expected to collect some building materials prior to beginning construction, and use loan capital if savings are not sufficient. Local groups who prepare applications to Federation loan funds are required to analyze household income and expenditures to assess affordability. It is generally accepted that loan repayments for capital investments should be completed in 2–3 years. For the loan funds in the three Alliances charging interest of 1% a month, the loan has to be between $50 and $120. The second strategy is innovation to reduce the size of the capital investment. The third is to build political pressure to secure finance and (if required) regulatory reform to legalize new approaches.

Working without state subsidies, some groups may be able to negotiate support for local improvements, but it is extremely difficult to bring costs down to this level of affordability. As illustrated in Table 2, few of the precedents have come close. Forms of collective toilet provision and/or waste management (either shared or communal) help to reduce costs, but are difficult for either residents or local authorities to accept. The shared toilet blocks for council tenants in Chinhoyi come closest. The affordability challenge is also evident in the fact that the models where funds seemed most likely to come from the government—improved pit toilets in Kitwe and the expansion of the simplified sewers in Dar es Salaam—are also those that cost the most. The demonstration toilets in Kitwe are not in the table as they were never built, while the costs of the simplified sewers in Dar es Salaam are likely to be considerably higher away from the water treatment plant that is adjacent to the settlement where the precedent is located. Even for those within the vicinity they are being asked to pay $1.5 a month per toilet to the utility to drain the waste into the plant.

(d) *SDI Alliances in the four cities and the housing tenure challenge*

The affiliates in three of the cities have to deal with a situation in which a majority of those living in informal settlements are renting accommodation. This creates difficulties for low-cost sanitation improvement, as tenants and owners often have conflicting interests that can be difficult to negotiate away. Other difficulties arise when the shelter owners' rights to the land are disputed, and there are risks that residents will have relocate with little or no compensation.

Given the insecurity of most tenancies in informal settlements, tenants rarely invest in constructing more than rudimentary private toilets. If landlords are considering building a toilet for their tenants, they and their tenants have very different concerns.

Table 2. *Cost of precedents (in US dollars)*

Country	Project	Average capital cost (US $)	Monthly household cost (US $)[a]	Comments[b]
Blantyre	Household eco-san	279	23–27	Household provide materials; total cost of $333. Facilities and costs shared with tenants
Blantyre	Toilet block (eco-san)	24,000	50.4	Cost of six family members using facilities four times daily
Chinhoyi	Household eco-san	310–350	18	Limited sharing of facilities.
Chinhoyi	Household sewered toilets	480	20	Some sharing of facilities between home owners and tenants. Includes water charges
Chinhoyi	Communal block	9,000	3	Recently been built and operational experiences now underway
Dar es Salaam	Pour flush	270–623	13–30	Landlord pays; some costs may be passed on to tenants
Dar es Salaam	Household eco-san	270–623	13–30	Landlord pays; some costs may be passed onto tenants
Dar es Salaam	Gulper	15–35	N/A	This is the cost of pit emptying. May be paid by landlord or all
Dar es Salaam	DEWATS	300–400	To be determined	New technology and costs being assessed
Kitwe	Household eco-san	188	11	Costs est. at $266; households provide some of their own materials
Kitwe	Septic tank	547	14–22	This was intended to be shared investments but this was not possible because too few households wanted this option

Source: Draft project document (minor revisions possible).
Notes to table:
[a] This is the capital repayment only. There are operational and maintenance costs in addition.
[b] Loans are used in all four cities. In Blantyre this is 4% a month for a year. In all other cases loans are for two years at 1% a month.

Tenants fear that improvements to sanitation services will increase rents by more than they can afford, and many recall having to leave accommodation in the middle of the night due to unaffordable rent arrears. Landlords fear that they will not be able to recoup the costs or that tenants will not maintain the facilities. The response of Alliances has been to seek agreements from the landlords to keep any increases to a minimum, starting with discussion within the federation, where both landlords and tenants are usually represented (Stephen, 2012). In the medium term, affiliates hope to institutionalize agreements that delay rent increases for a number of years. In the longer term, affiliates recognize they need to develop greater expertise with informal settlement upgrading, including around issues of tenure. The Kenyan Alliance, whose members came to share their experiences at a recent meeting of the FCSP, have been making headway with a combined "Campaign for Sanitation Land and Justice", which has used sanitation as an entry point for negotiating tenure issues, including justice for tenants (Sverdlik & Mbaka, 2015).

Land tenure issues are also evident in the difficulties that the Malawi Alliance faced in replicating the decentralized waste water treatment technology in informal settlements. This is both because they cannot secure land for the treatment pond and the plots need to be reconfigured for straight lines to enable the installation of sewers.

5. CONCLUSIONS

The examples of OPP in Karachi and the Indian Alliance in Pune and Mumbai confirm many of the arguments made by McGranahan (2015): that in deprived urban settings a key to sanitary improvement lies in meeting the institutional challenges posed by the need for local collective action, coproduction, affordability and housing security. However, the examples from the FCSP illustrate how difficult it can be to overcome these obstacles, particularly in the short-term and with a primary focus on low-cost on-site facilities. While social innovation was central OPP's and the Alliance's approaches, this innovation was tightly bound up with technologies—the simplified sewers for OPP and the communal toilet bocks for the Indian Alliance. These did not just provide sanitation at a low cost, but provided traction for users to collaborate with each other, coproduce improvements with the local authority, work together to drive down costs, and work to improve housing security. This was facilitated by the existence of state budgets that could be used to support this work: How the funds were spent had to be amended but idea that sanitation was a public rather than private good was already established. Only time will tell whether the more promising precedents set during the FCSP will develop into scalable models equivalent to those developed by OPP and the Alliance, but the challenges still look formidable.

Over time, following demonstrated residents' collaboration and demand for their solution, both the OPP and the Indian Alliance were successful in securing the kinds of political support required to scale up these efforts. In neither case was this support immediately forthcoming. In both cases coproduction developed incrementally and iteratively as initial explorations convinced doubters and helped to secure and consolidate support among both politicians and officials. This resulted in the deepening and widening of the initiative. Senior figures acknowledge the importance of the political momentum that developed, and the way it engaged both elites and local politicians. In terms of the scaling of these initiatives beyond the city in which they developed, there are varied experiences. In India, lower densities enable more options and have led to alternative solutions being developed for other urban centers. In Pakistan, initial attempts at replication struggled in part due to the difficulties of establishing initiatives in context that lacked the gradient of Orangi. These have been overcome with time with further technical innovations and supported by the evident success achieved by the approach in Karachi, and the approach has now been accepted in national policy (Pervaiz *et al.*, 2008).

In all of the four African cities it has proved hard to identify a technology which, when implemented by new collective social practices, enables success at scale. Each of the challenges remains important and addressing them is work in progress. Efforts have been made to develop collective action, strengthen collaboration with the state (and encourage coproduction), improve affordability and improve tenure security (or, in the case of tenants, manage within the constraints of limited security). However, without more state finance it is difficult to scale any of the initiatives discussed, and without more attractive

low-cost options it is difficult to attract more finance or generate pressure from below. It may be possible to develop more promising systems around simplified sewers (possibly with more decentralized wastewater treatment), some form of community or shared latrines, and/or community-organized pit-latrine emptying, but to date none of these has provided the same traction for collective action and coproduction as has been achieved in Mumbai, Pune and Karachi. These outcomes suggest the need to continue work in this area. On the one hand, existing solutions need to be tested and modified to work better in constrained circumstances. On the other, experiences to date point to the need to think "outside the box"—something which characterized the early days of sanitation work in both Karachi and India.

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